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Features of the density of the location and changes in the cellular composition of the lymphoid formations of the vaginal vestibule of rats after a treatment course of naphthalan baths

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The purpose of the study was to analyze the changes in the quantity and qualitative composition of the lymphoid tissue of the walls of the rat's vaginal vestibule after a treatment course of naphthalan baths. The lymphoid formations of the walls of the vaginal vestibule of sexually mature female Wistar rats subjected to naphthalan baths were investigated. Obtained digital data were subjected to statistical processing. Morphological analysis showed that in the mucous membrane of the vaginal vestibule in rats of both experimental groups, as well as in the control, all forms of lymphoid tissue are present. Lymphoid formations of the vaginal vestibule are located near the initial parts of the glands. The lymphoid formations of the mucous membrane of the vaginal vestibule of rats do not actually change quantitatively and qualitatively after the course effect of freshwater baths, which indicates their safety. The treatment course of naphthalan baths causes an increase in the number of cells of the lymphoid tissue in all lymphoid formations, activation of lymphocytopoietic processes, a decrease in the level of cellular degeneration of lymphoid tissue.

Keywords: *The vaginal vestibule, the lymphoid nodules, the diffuse lymphoid tissue*

INTRODUCTION

Vaginal pathology is a significant medical and social problem that requires the development of new and the updating of existing means of treatment, prevention and rehabilitation (Scherbina and Lamia, 2016). Significant importance in the organization of therapeutic and preventive measures is given to balneological procedures, especially with the use of naphthalan baths, the effectiveness of which has been repeatedly proved in gynecological practice (Kyazimov, 2009). The effect of naphthalan, according to the prevailing opinion, is mainly caused by the presence in its composition of polycyclic naphthenic hydrocarbons, which are also present in the composition of various hormones, bile acids, vitamin D and some other biologically active substances (Badalov, 2003). The anti-inflammatory effect of naphthalan oil is provided by its anti-allergic effects (Sizyakova, 2010).

At the same time, there are almost no experimental studies of the effectiveness and safety of naftalan effects in the scientific literature, there have been almost no experimental morphological studies on this subject, or they have been extremely superficial. At present, it has been established that one of the most adequate markers of any external environmental influences is lymphoid tissue (Nikityuk and Klochkova, 2015).

The purpose of the study was to analyze the changes in the quantity and qualitative composition of the lymphoid tissue of the walls of rat's vaginal vestibule after a course of naphthalan baths.

MATERIALS AND METHODS

The lymphoid formations of the walls of the vaginal vestibule of adult Wistar rats subjected to experimental exposure to naphthalan baths (30 rats) were investigated according to the schemes adopted in modern balneological practice. Lymphoid formations of the vaginal vestibule were also studied in rats subjected to a fresh bath course (30 rats) and in intact 30 rats (control). Analysis of the vaginal smear confirmed the same state of the ovarian cycle (Oransky, 1998). The total dura-

tion of the treatment course of naphthalan and fresh baths is similar - 20 days. The duration of one exposure (bath) was 8–10 minutes, the bath temperature was 37-38°C. From the experiment, rats were derived simultaneously (by decapitation, in compliance with ethical norms). After fixation of the material in neutral formalin, subsequent alcohol wiring and paraffin embedding at the level of the anterior, middle and back third walls of the vaginal vestibule, 5–7 μm thick transverse sections were made and stained with hematoxylin-eosin and picrofuxin according to van Gieson

For the lymphoid tissue of the walls of the vaginal vestibule, the percentage of lymphoid nodules with a reproduction center was determined (the total set of lymphoid nodules on the cut was taken as 100%), the length, width and area of the cut at the lymphoid nodules with and without reproduction center, as well as the length, width and area of reproduction centers themselves. The density of the cells of the lymphoid series (their number on an area of 880 μm² cut) in the composition of the diffuse lymphoid tissue, lymphoid nodules without centers of reproduction, in the centers of reproduction and the mantle of lymphoid nodules was determined.

Obtained during the study of digital data were subjected to statistical processing. At the same time, general recommendations for medical and biological research were followed (Glantz, 1999).

RESULTS AND DISCUSSION

Morphological analysis showed that the mucosa of the vaginal vestibule in rats of both experimental groups, as well as in the control, contains all forms of lymphoid tissue, including intraepithelial lymphocytes, diffuse lymphoid tissue, lymphoid nodules with and without reproduction centers. Lymphoid mucous membranes of the vestibule are always located near the initial parts of the glands, accompanied by their excretory ducts in the form of a rim.

The performed morphometric analysis showed an almost complete absence of changes with respect to the control, after a course of fresh baths. On the contrary, naphthalan baths provide activation of lymphoid tissue formation processes. Thus, the proportion of lymphoid nodules with a center of reproduction (the most functionally mature form of lymphoid tissue) increases as a result of the bath course relative to the control, by 1.9 times ($p < 0.05$).

Localization density of lymphoid cells as part of lymphoid nodules without a reproduction center in the walls of the vaginal vestibule in rats of the experimental group as a result of a course of naphthalan baths, in the walls of the anterior third of the vestibule 1.39 times ($p < 0,05$), middle third 1.33 times ($p < 0.05$), and the back third - 1.29 times ($p < 0.05$) and for the vaginal vestibule as a whole - 1.33 times more ($p < 0.05$), compared with the control (Table 1).

In the reproduction centers, as a result of the treatment course of naphthalan baths, in the walls of the anterior third of the vestibule 1.31 times more ($p < 0.05$), in middle third - 1.32 times more ($p < 0.05$), in the back third is 1.45 times more ($p < 0.05$) and for the vaginal vestibule as a whole - 1.35 times more ($p < 0.05$), in comparison with the control (Table 2).

Table 1. The density of the lymphoid cells in the lymphoid nodules without a center of reproduction in the vaginal vestibule of rats after the treatment course of action naphthalan baths (X±Sx; min-max).

Nature of the effects	n	Part of the vaginal vestibule			
		Anterior third	**Middle third**	**Posterior third**	**The vaginal vestibule as a whole**
Naphthalan baths	30	29.2±0.5 21-33	29.5±0.5 24-36	32.6±0.5 27-38	30.4±0.4 26-35
Fresh baths	30	20.2±0.3 16-23	22.1±0.3 19-25	25.3±0.5 18-28	22.5±0.4 17-26
Control	30	20.9±0.4 15-24	22.1±0.4 18-26	25.3±0.5 19-29	22.8±0.4 17-26

Table 2. The density of the cells of the lymphoid series in the centers of reproduction of lymphoid nodules in the vaginal vestibule of rats after a treatment course of naphthalan baths (X±Sx; min-max).

Nature of the effects	n	Part of the vaginal vestibule			
		Anterior third	Middle third	Posterior third	The vaginal vestibule as a whole
Naphthalan baths	30	22.2±0.4 16-24	22.5±0.4 16-24	23.6±0.3 24-31	22.7±0.3 23-30
Fresh baths	30	16.2±0.3 13-20	16.1±0.3 13-20	16.3±0.3 15-21	16.2±0.3 13-20
Control	30	16.9±0.3 14-21	17.1±0.3 14-21	16.3±0.4 14-22	16.8±0.3 14-21

The result of the treatment with naphthalan baths is an increase in the percentage of lymphocytes (1.1-1.2 times, $p < 0.05$). There is an increase in the number of lymphoid cells with signs of mitosis (1.3-1.5 times), which indicates the activation of lymphocytopoiesis; the level of cellular destruction decreases - the number of cells with signs of degeneration (1.2-1.6 times, relative to the control). Similar changes in the cellular composition of the lymphoid tissue, as a result of the course action of iodine-bromine and organic bituminous baths, have previously been shown in the rat larynx lymphoid apparatus as an example (Seidova, 2001). Similar materials are cited by other authors who have studied the lymphoid apparatus of the larynx (Shadlinski and Movsumov, 2002; Movsumov, 2004), the trachea and the main bronchi (Huseynov, 2011), the lymphoid structures of the extrahepatic biliary tract (Allahverdiev, 2008).

Thus, the conducted studies revealed significant formative changes of the lymphoid apparatus of rat's vaginal vestibule after a course of naphthalan baths, proving the safety of these effects.

CONCLUSIONS

1. Lymphoid formations of the mucous membrane of the vaginal vestibule are always oriented mainly near the small glands of this area. Both for experimental and control observation groups, significant individual variations in the number of lymphoid cells in all morphogenetic forms of lymphoid tissue are typical.
2. Lymphoid formations of the mucous membrane of the vaginal vestibule of rats (do not differ from the control) quantitatively and qualitatively do not change after the course effect of fresh baths.
3. The treatment with naphthalan baths causes an increase in the number of cells of the lymphoid tissue in all the lymphoid formations of the vestibular mucosa, the activation of lymphocytopoietic processes, a decrease in the level of cell degeneration of lymphoid tissue.

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Naftalan vannaları kursunun qəbulundan sonra siçovulların uşaqlıq yolu dəhlizi limfoid törəmələrinin hüceyrə tərkibinin yerləşmə sıxlığının və dəyişməsinin xüsusiyyətləri

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Tədqiqat üçün cinsi yetişkənliyə çatmış, eksperimental olaraq naftalan vannalarının təsirinə məruz qalmış Vistar xətti siçovullarının uşaqlıq yolu dəhlizi divarlarının limfoid törəmələri öyrənilmişdir. Morfoloji analiz göstərmişdir ki, siçovuların uşaqlıq yolu dəhlizinin selikli qişasında həm eksperimental qrupda, həm də nəzarət qrupunda limfoid toxumanın bütün formalarına rast gəlinir. Siçovulların uşaqlıq yolu dəhlizinin selikli qişasının limfoid törəmələri adi su vannalarının təsirinə məruz qaldıqdan sonra, kəmiyyət və keyfiyyət baxımından dəyişmirlər ki, bu da onların təhlükəsizliyini göstərir. Naftalan vannalarının qəbulu bütün limfoid törəmələrdə limfoid toxuma hüceyrələrinin sayının artmasını, limfositopoetik proseslərin aktivləşməsini, limfoid toxumanın hüceyrə degenerasiya səviyyəsinin enməsini şərtləndirir.

Açar sözlər: *Uşaqlıq yolu dəhlizi, limfoid düyüncüklər, diffuz limfoid toxuma*

Особенности плотности расположения и изменения клеточного состава лимфоидных образований преддверия влагалища крыс после курса нафталановых ванн

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Исследованы лимфоидные образования стенок преддверия влагалища половозрелых крыс-самок линии Вистар, подвергнутых экспериментальному воздействию нафталановых ванн. Морфологический анализ показал, что в слизистой оболочке преддверия у крыс обеих экспериментальных групп, как и в контроле присутствуют все формы лимфоидной ткани. Лимфоидные образования слизистой оболочки преддверия влагалища крыс после курсового действия пресных ванн фактически количественно и качественно не изменяются, что свидетельствует об их безопасности. Курс нафталановых ванн обуславливает увеличение количества клеток лимфоидной ткани во всех лимфоидных образованиях, активацию лимфоцитопоэтических процессов, снижение уровня клеточной дегенерации лимфоидной ткани.

Ключевые слова: *Преддверие влагалища, лимфоидные узелки, диффузная лимфоидная ткань*